

**Detail Report**

**U.S. EPA Regional Sustainability Infrastructure Forum**

**U.S. EPA Region 5 and Region 7**

**November 13 and 14, 2007**

**St. Louis, Missouri**

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## Attachments

- SI Forum Brochure
- SI Forum Agenda
- Final SI Forum Presentation: Summary of Track Topic Discussions
- Matrix of SI Forum Follow-up Action Items for U.S. EPA
- Region 5 Summary of Key Messages and Follow-up Activities from the Forum
- SI Forum Speaker and Moderator Biographies
- SI Forum Attendees List
- SI Forum Acknowledgements

This Detail Report is a record of the proceedings at the U.S. EPA Region 5 / Region 7 Sustainable Infrastructure Forum held in St. Louis on November 13 and 14, 2007. Following the summary below of the goals of the Forum and the key recommendation for U.S. EPA, the report provides a detailed record of the issues addressed and ideas generated during sessions dedicated to each of four Forum tracks. A report section for each track includes notes from the interactive discussions among track leaders, speakers, and participants, and summaries of speaker presentations and the follow-up questions and answers sessions. The report also includes detailed notes from the presentations given in open session to all Forum attendees.

### **Goals of the Sustainable Infrastructure Forum**

This report is a detailed record of the discussions at the U.S. EPA Region 5 / Region 7 Sustainable Infrastructure Forum held in St. Louis on November 13 and 14, 2007. Sustainable Infrastructure (SI) is a U.S. EPA initiative to raise awareness of water and wastewater infrastructure needs and to promote practices to ensure that infrastructure is properly operated and maintained, and that sufficient capital is available to fund future needs and interim replacements. The Forum in St. Louis was the second of a number of “Regional SI Forums” that U.S. EPA facilitated to provide SI information to representatives from utilities (administrators and operators), academia, state and federal governments, consulting engineers, and other water infrastructure stakeholders. The Forum was also designed to gather valuable feedback and insight from these water infrastructure experts regarding the challenges they have faced, the opportunities they have recognized, and the solutions they have implemented.

To elicit these insights, each Forum attendee participated in a series of facilitated interactive group discussions that focused on one of the Forum’s four topic tracks:

- Developing new and innovative technical solutions, and advancing beneficial solutions into practice
- Extending the life of utilities through Environmental Management Systems (EMS) and Asset Management approaches
- Reducing utilities’ future capital costs
- Identifying sustainability solutions for small utilities

The overall goal of the Forum was for U.S. EPA to assemble the SI solutions, approaches, and strategies that were generated in the track discussions into a suite of best practices that communities can access to inform the planning, design, financing, construction, and operation of their water and wastewater infrastructure. System managers, in coordination with their engineers, financing sources, contractors, and operators, will be able to examine the suite of best SI practices and select the most appropriate technical, operational, management, and financial solutions to affordably address the needs of their users.

## **Key Recommendations for U.S. EPA**

The facilitated discussions in each track generated a great deal of information about obstacles, opportunities, and actionable next steps for U.S. EPA. The Track Topics section of this report presents a detailed record of those discussions for each track. In addition to the track-specific information that was developed at the Forum, the discussions also yielded four key recommendations for U.S. EPA action.

- U.S. EPA must facilitate the development and implementation of new SI solutions through ideas through education, outreach, research, and technical assistance.
- U.S. EPA must provide technical assistance and training to small systems seeking to develop and implement environmental management systems and asset management plans, to ensure that systems are run as efficiently as possible.
- U.S. EPA must recognize that each utility has distinctive needs, and must address those needs with strategies tailored to its specific circumstances. Smaller systems, in particular, must be offered potential SI tools and solutions that are both effective and practical in the context of their volume of activity and their financial, managerial, and operational capacity.
- U.S. EPA must take an active leadership role in promoting the value of water services, and must support regional and local education and outreach efforts that communicate to the public how local funding is necessary to build and maintain sound water infrastructure that protects public health.

## **Track Topic Discussions**

Each SI Forum attendee selected one of the four Track Topics identified above, and participated in a series of facilitated discussions in which they shared their relevant perspective and experiences with their fellow track members. Track leaders guided these discussions through three serial phases:

- Identifying significant challenges and obstacles
- Sharing solutions, tools, and approaches for improvement
- Turning ideas in action / follow-up steps

For each of the four track topics, the issues raised in the discussions during each phase are identified in the following pages of this Detail Report. Selected discussions are also available on web-based video via the link: <http://accordent.powerstream.net/008/00136/SI%2DFORUM/> which also includes several presentations made to all Forum attendees in plenary sessions.

### **Track Topic: Developing new and innovative technical solutions, and advancing beneficial solutions into practice**

#### **Key Challenges and Obstacles**

- Decision-makers are risk-averse. Paul Reitz stated it this way: “If you need something and only have a limited amount of money, would you spend it on a sure thing or a perceived unknown?” People are also concerned about possible liabilities if something goes wrong. There may also be uncertainty as to what maintenance will be required for a new technology. These factors create important barriers to adoption of new technologies.
- There are challenges associated with funding of research to test/demonstrate the performance of technologies and check for unintended effects. In some cases the costs are significant, and the companies working on the technology may be small. Forming partnerships with universities in some cases may be problematic due to complexities regarding who then "owns" the technology. Also companies with new products on which research is needed may often work with small research firms because they have lower costs and/or they provide quicker turnarounds or more flexible timeframes. Research costs include testing in laboratory environments and ramping up to “real world” pilot tests.
- There may be complexities in some cases related to approval processes. For radically new technologies reviewing agencies may not be familiar with some dimensions of the technology and/or suitable review tools or protocols may not be set up. Also, in most cases State agencies need to review and approve the technologies/processes proposed for water and wastewater utilities. Reviewing a new technology requires significantly more resources as compared to a "tried and true" technology.

#### Pathways for Progress/Action Steps

- It may be possible to counteract tendencies to be risk-averse by phasing in new technologies, use of flexible designs (where feasible), and use of adaptive management.
- It may be possible to improve communications related to new technologies, to share information about research activities and to share findings with standard-setting bodies, state agencies, and practitioners. The approaches that could potentially be used include forums, clearinghouses, and webcasts. This may provide additional benefits in terms of helping professors integrate new technologies into academic curricula. On a related note, it may be beneficial to implement award/recognition programs for new/innovative technologies.
- For some new/emerging technologies, such as green infrastructure approaches for managing stormwater, it may be appropriate to perform national or regional testing of new technologies (vs. localized testing), to achieve economies of scale and to foster a degree of standardization in decision-making criteria. If EPA were to conduct research, implement demonstration projects, and produce standardized performance information on Stormwater Best Management Practices, this would reduce uncertainty, promote consistency in local decision-making, and provide economies of scale.

- To deal with approval process issues it may be feasible to make supplemental technical resources available to review bodies to better understand and evaluate radically different/new technologies. Supplemental resources could also be used to develop updated approval criteria or review protocols for a new technology. It may be appropriate in some cases to have an Ombudsman or Liaison to work between technology developers and approval Agencies. One idea would be a New Technologies Compliance Assistance Center, where the CAC Director would serve as the ombudsman and provide answers to guide the innovator throughout the approval process.

### Presentation Summaries

#### **David Reusswig & William R. Peterson, Ph.D.: Moving a New Technology Through R&D Phases to Implementation**

#### Q&A:

Technical questions posed to Dr. Peterson and David Reusswig:

- How does the filter system kill bacteria and viruses?

The treatment system kills bacteria through cellular disruption (lysis). The filter media cuts the cell wall and cytoplasmic membrane as the microorganism comes in contact with the media. Similarly, the filter system kills viruses by disrupting the membrane on the virus.

- What happens when fish ingest the filter media?

The monomer changes to a polymer and when ingested by fish, one test showed that the fish gained weight. No toxicity effects have been identified.

- How long do the filter media last?

The speakers estimated 3-5 years.

- How cost effective will this be for wastewater treatment plants?

The company is continuing to develop data on long-term performance and costs. Operational costs look like they will be substantially lower as compared to other methods of wastewater disinfection. David Reusswig noted a major Midwestern utility will be doing some pilot testing of the effectiveness of the filters on treated wastewater. A new product that can kill bacteria and viruses at a relatively lower operational cost would fit well in the framework of sustainable infrastructure because it would save utilities money.

**Paul Reitz: How Engineering Firms Can Help Communicate Research Needs and/or Help Move New/Innovative Technologies to Implementation**

Engineers play a role in infrastructure development while fulfilling both an obligation to the client and a duty to protect public health and the environment. The engineer represents the client by identifying and solving issues, understanding regulatory compliance, controlling costs and providing quality assurance of construction. Engineers can help move sustainable infrastructure forward in many ways. Five ways that they can help include:

- 1) Being the liaison between local stakeholders and clients to identify potential projects or opportunities.
- 2) Providing technical assistance in developing alternatives for adapting successful practices to local conditions.
- 3) Communicating client constraints and needs to the regulatory community, and present full cost price of infrastructure to the public.
- 4) Identifying and participating in potential local pilot or case study projects, including long term monitoring.
- 5) Advocating proper use of Sustainable Infrastructure to clients.

Examples of local sustainable infrastructure successes include highway construction recycling and reuse, trenchless pipe replacement, Brownfields Redevelopment and mine or quarry reclamation. Sustainable Infrastructure challenges that engineers face include urban stream stabilization, pervious pavements, low impact site development and identifying other best practices.

**Susan M. Morgan: How Academic Institutions Can Provide Solutions to Help Meet Infrastructure Needs**

Academic institutions can provide solutions to help meet infrastructure needs by increasing the focus on sustainable infrastructure. Academic institutions can accomplish this through three avenues: teaching, research and service. Ways to bring greater focus to sustainable infrastructure through teaching include offering a variety of courses which discuss both theory and practice, presenting findings so that others have the ability to integrate it into their own practice, integrating construction, operation and maintenance into the design, considering policy aspects and offering continuing education. Research can be conducted to determine how to improve designs and advance operation and maintenance practices. Research agendas should be developed based on field experience. Adoption of change has been slowed by conservative designs, which are a result of public failures and large costs. Academic institutions need to focus on going beyond providing the tools, and teaching integration in order to solve an engineering problem.

**Randy Thorson: How State Plan Approval Programs Deal With New/Innovative Technologies**

The Minnesota Pollution Control Agency (MPCA) feels it is able to assess technologies reliably and effectively. Minnesota does not have design rules. In order to approve technologies, Minnesota state regulations require “An analysis of all feasible treatment alternatives that are capable of meeting the applicable effluent, water quality, and public health requirements for 20 years” under Minnesota Rule 7077.0272, Subpart 2.D. As a result, MPCA uses guidance based on ten state standards and the MPCA Reliability Criteria to approve new technologies. Technologies recently assessed include biological aerated filters, membrane biological reactors, and constructed wetlands.

**Dan Murray: EPA’s Role in Fostering and Conducting Research in Support of the Sustainable Infrastructure Initiative**

EPA’s goal is to conduct research and demonstrations and develop technical guidance to transfer *innovative* technologies and approaches for more cost-effective operation, maintenance, repair and replacement of aging and failing drinking water and wastewater systems and development and application of advanced designs and management approaches for drinking water and wastewater systems. Research focus areas for aging water infrastructure in EPA’s Office of Research and Development include: inspection and condition assessment, system rehabilitation (Repair to Replacement), advanced design and management concepts and wastewater and water reuse treatment technologies. Examples of projects include: “State of the Technology” Assessments, including internal camera inspection technologies, rehabilitation of house laterals and sewer liner retrospective; Innovative Technology Demonstration Programs demonstrating emerging inspection and monitoring approaches and new repair, renewal and replacement materials and techniques; Applied Research and Field Application such as integrated system management and decision support, system failure analysis, modeling and forecasting, and; basic research and bench or pilot scale testing, including advanced hydraulics for sanitary sewers and new sewer designs and system configurations.

The Drinking water distribution systems and sewer systems need more opportunity to perform asset management. Resources are already dedicated towards asset management of municipal wastewater facilities.

**Bill Abolt: Green Infrastructure/Sustainable Development Approaches for Meeting Infrastructure Needs**

Sustainable development applies integrated solutions to solve real problems. Sustainable development optimizes resources and deploys them to create lasting economic, environmental and community value. Green infrastructure is a key element of sustainable design and provides multiple benefits, including: pollution reduction, increased stormwater control, cost control, enhanced aesthetics, and increased open space. Green infrastructure strategies can be incorporated into both site specific developments and area-wide plans. However, more needs to be done to recognize, quantify and realize the specific values that are created by sustainable development.

Shaw environmental has been involved with numerous projects relating to green infrastructure, including riverfront redevelopment implementing green concepts in Aurora,



Illinois. Key strategies used to achieve riverfront redevelopment include using enhanced riverfront as an amenity, improving water quality, remediating brownfields, and eliminating obsolete infrastructure. Aurora worked with the state to identify new tools for sustainable redevelopment. Aurora is redeveloping 579 acres by creating a rooftops to rivers stormwater corridor, constructing a naturalized treatment wetland, promoting neighborhood best management practices, alleviating combined sewer overflows, increasing stormwater detention capacity, creating urban wildlife habitat and fostering environmental education. Shaw Environmental recommends using an integrated process, assessing barriers and constraints, starting early, involving and educating stakeholders and analyzing costs and benefits to launch a redevelopment project. Advanced redevelopment can be made possible by designing regulations that support sustainability, creating standard approaches, measuring results, and assessing transaction costs.

**Kevin Schafer, P.E.: How Municipal Infrastructure Managers Decide If/When to Implement New/Innovative Approaches**

Milwaukee is transitioning from a grey approach to a green approach. Combined sewer overflows and sanitary sewer overflows have been significantly reduced by expanding collection system capacity, upgrading the wastewater treatment plant and applying green practices. While the city upgraded its collection system to increase capacity and curb overflows, beach closures were still occurring due to stormwater run-off. In 2002, Milwaukee Metropolitan Sewer District introduced a stormwater rule, which required 28 communities to implement a stormwater runoff ordinance for all new impervious areas greater than a half acre. Since 2002, the city has also sponsored 23 projects for stormwater best management practices, conducted public education, planned for flood management, focused on bioretention, created stream buffers, installed over 7000 rain barrels, built a green roof that covered 4000 square feet, and encouraged multiple communities to build rain gardens and green parking lots. As a result, water quality has improved significantly. Other benefits observed include improved air quality, reduced energy costs, greater acceptance from the public and elected officials and an overall improved quality of life.

**Q&A:**

Questions for Kevin Schafer, Executive Director, Milwaukee Metropolitan Sewerage District, focused on the District's efforts to implement green infrastructure in Milwaukee.

A question was posed as to if the EPA recommends or mandates the use of specific new technologies. The EPA does have treatment standards for many point source discharges but does not recommend or mandate the use of specific technologies. EPA can and does encourage the use of technology to solve problems.

## **Track Topic: Extending the life of utilities through Environmental Management Systems (EMS) and Asset Management approaches**

### Problems, Challenges and Obstacles

#### *Community-Influenced*

- Communities must identify the current state and needs of the system in order to manage it.
- Industry personnel is aging.
- Lack of planning and lack of communication between the city and the utility contribute to inefficient solutions. For example, in San Antonio, pipes that ran along the highway were replaced three times because the pipes installed did not meet capacity. Additionally, sometimes the developer should be responsible for paying for it, or making the fee known to its customers, but does not discuss utility access with its customers. Some areas in Missouri don't have zoning, and the developer connects to the utility, but does not let the utility know. Then, the subdivision is held responsible for the cost to connect to the system.
- There's a lack of desire to know and understand the system. Operators are weary to know their system better because they may be more liable in instances of non-compliance.
- Communities need to plan and better manage growth. Communities need to recognize that growth needs to be subsidized. Growth pays for growth!
- There is a lack of communication between staff and elected officials.
- Elected officials are tempted to refrain from raising rates during term, which prolongs the problem until a new official is elected who chooses to address the problem. A positive example of an official who responded to prolonged infrastructure problems is the Mayor of Atlanta. She did a great job responding to EPA's Consent Decree.

#### *Regulatory Agency-Influenced*

- We need to find ways to motivate communities to action independently, where communities seek compliance for reasons other than force by regulatory agencies.
- The paradigm at local, state, or federal levels needs to change. The public does not understand that regulators have generations of the public's best interest in mind.
- There's a need to increase trust and faith in government. In the 1970s, people in the world looked to the U.S. Now they look to other countries. People lost faith in government. People are more self-focused now than in the past.
- Changing regulations is difficult. Customers and/or the public don't understand proposed regulations and customers don't believe comments are heard. There's a need for more education.
- There is a lack of zoning in newly developed areas.
- Extreme non-compliers need to be dealt with more severely than communities with better compliance histories. For example, the City of Lawrence felt it kept accurate records, but was cited for missing one record out of 50. Meanwhile, a nearby community does not report anything and does not get cited.
- Industry needs to believe in the value of what they are doing. Customers believe in the value of clean water, but staff and managers need to acknowledge that value.

- Barriers to utilizing an EMS and/or Asset Management include: Insufficient resources to implement a new program, resistance to change, finding a leader to break the cycle.

#### *Multiple-Party Influenced*

- We need to change our dynamic to give people credit for performing operation and maintenance to increase the life of the system or facility.
- The U.S. faces a threat towards privatization. Since 1990, the World Bank has encouraged privatization of utilities. However, the U.S. tax structure provides a capital advantage to the public sector. As a result, there is more contracting and consolidation.
- There's a need for subsidy programs that focus on optimal use of money. Communities do not weigh in the full economic advantage when making decisions regarding pipe replacement. As a result, more money is spent rebuilding systems. Pipe life can be extended, but communities must be ready and willing to make an investment.
- Infrastructure needs to be constructed to meet the demands of a fast growth rate.
- There's a lack of partnership between regulators and utilities.

#### Solutions/Pathways to Progress

##### *Community-Enacted*

- Communities will act independently if they are given a vision. Some communities are uncertain of where or how to improve their system or facility, but will respond once this is identified. Examples of success stories should be shared. Look at people pursuing excellence and copy what they are doing. Seek outside assistance to encourage the utility to undertake an EMS or Asset Management assessment.
- Implement Environmental Management Systems.
- Conduct Asset Management.
- Develop a way to measure success so that results are tangible to showcase the value of an EMS or Asset Management program.
- Information is readily available, but someone needs to translate it to let others know how it relates to them.
- Recruit someone that has been through the process themselves to help. If someone has been through the process themselves, they can share experiences. This can't be over-emphasized. The advantage of using people that have "been there, done that" is extremely important.
- Utilize resources to prepare EMS or Asset Management plans. Resources include: the PEER Center, MEMP, web resources, county extensions and finance centers.

##### *Regulatory Agency-Enacted*

- The paradigm at local, state and/or federal levels can be changed by reconnecting people with regulatory decisions. People will be more agreeable to regulatory structure if they have involvement in the process. Currently, people have the opportunity to comment on technical regulations, but often they do not understand them. Regulations need to be more understandable to the general public.
- The public will trust the government if good environmental stewardship and good politics are implemented.

### *Multiple Party-Enacted*

- Funding for capital has led people to think capital is the best way. The bias needs to be taken out of subsidies or subsidy programs should be eliminated.
- Since the biggest cost of pipe installation is excavation, it may be more cost-effective to put in a dual pipe systems: one for initial need and one for future need.

### Turning Ideas into Action

At the end of the track, participants were asked if they would be willing to try to incorporate ideas and tools that were discussed. Two cities, Lincoln, NE and Springfield, MO, have expressed an interest in exploring the ideas and tools discussed during the track. Ruben McCullers will follow up with personnel from these two cities.

### Presentation Summaries

#### **Steve Albee: What Are We Facing?**

Understanding where resources come from is important in making decisions about infrastructure. The majority of resources (~87%) invested in infrastructure come from local sources. Water infrastructure, including sewers, drainage and water supply, accounts for 30% to 35% of all capital investment in an urban lot.

Management of utilities is highly decentralized. Most of the systems are small or very small. However, most of the population is served by a relatively few large systems. There are 16,000 public owned wastewater systems serving 75% of the population through centralized systems. There are 54,000 community based water systems serving about 94% of the population through centralized systems. The remainder of the population is served by on-site systems and private wells.

The demographics of people and systems are important. Long life assets (water infrastructure) are highly impacted by growth patterns and long term demographic shifts. Our systems are aging. The status quo will result in increased public health and environment risk. The projected growth alone could produce Biological Oxygen Demand loadings similar to the mid-1970s. Failure to manage the assets based on least life cycle costs strategies will require more revenues over the long term to meet service objectives.

Infrastructure challenges are not addressed through a one time fix, but rather a sustained commitment. The emerging focus is on taking the steps necessary to retain the gains achieved from the major investments of the last thirty years. The largest aspect of meeting the emerging challenge is that for the first time, in addition to making new investments, repair, renewal and replacement of existing systems is projected to become a large and growing aspect of the managerial and financial requirements.

Attitude is a big deal in establishing a sustainable situation. Applying sustainable infrastructure practices takes a paradigm shift. It's a transition from *building and operating* to *managing* assets, extending asset life, optimizing maintenance and renewal and developing

accurate long-term funding strategies. Customers need to understand what a utility does, believe that it has value and accept that the practices are competent, if not exceptional.

*3 big environmental issues:*

- 1) Energy*
- 2) Climate change*
- 3) Sustainable water*

*- Infrastructure is dominant issue regarding sustainable water*

*32 countries (6 continents) at Asset management meeting in Portugal – all countries have similar issues. At previous 2 meetings, there were 6 and 12 countries, respectively.*

*Very, very difficult to run first class country or city on second rate infrastructure*

*Capital intensive industry*

*Highly decentralized management (slide 9)*

*Demographics of People and Systems are Important – population center is shifting – population moving west and south*

*Density in which people are located has changed dramatically since WWII.*

*Over the last several decades, investments in expansion and upgrade. 50 million more people served today compared to 1968. Will add 100 million more people in the next 25 years. Easy fixes have already been done. In the future, more is going to be expected than ever has been.*

*Gap Report (begin slide 18)*

*\*Our systems are aging which results in increased risk.*

*Infrastructure not addressed through a one time fix.*

*EPA's Agenda*

- Better management*
- Water efficiency*
- Full cost pricing*
- Watershed approach*

*First three (better management, water efficiency, and full cost pricing) are optimization and last one (watershed approach) is “am I making the right decisions.”*

*Local level is where this is won or lost. First generation was getting the system built, next generation is about managing the system.*

*2 Things to think about:*

- *How do we deploy our human resources*
- *How do we optimize the value of our physical resources*

*Preconditions for a utility to gain a community support for a sustainable pathway (slide 28)*

*\*Know your own system!*

*Business risk exposure drives work program. (slide 35)*

*Condition Assessment (slide 36)*

*Increase investment on process. Make sure the right decisions are being made.*

*\*It is all investment.*

*Attitude!! – Great big deal. Communities can be broken down as follows:*

- *Those that are at leading edge (do it early).*
- *Could be an A, but.... Have same capabilities, but want to watch and see it work before they do it.*
- *Passing is good enough....*
- *Make me.....*

### **Jeanette Klam: How the Lawrence, KS Water Department Used an EMS to Address their Concerns**

Lawrence, Kansas is a city with a population of approximately 90,000 and growing. It is surrounded by rural and agricultural land. Management had read or heard about EMS and obtained funding through the National Biosolids Partnership (NBP). The process and timeline was as follows: In May 2000, the city committed to NBP. By October 2005, it was the tenth agency to be certified. A consultant was hired in March 2006, and a combined third party audit occurred in October 2006. By December 2006, the certification was received. Lawrence became a performance track member in September 2007. The EMS was expanded to all departments in October 2007. The city hopes to develop its own management system standard in the future.

The EMS was successful because of many factors. The speaker recommends making it simple. Remember that there are always things to improve upon. Recognize an EMS is not a project, but a new way of doing business. Allow time for “cultural” change in an organization. Personalize it to make it work for you. Recognize it’s not command and control or regulatory. Approach the third party audit remembering that it’s not pass/fail.

### **Heather Himmelberger: Asset Management Use**

Communities can start anywhere with asset management to achieve victories. Criticality exercises change operator thinking to recognize components of the system that are truly critical to sustained performance.

In the first case study, a system requested grant funding to replace its distribution system, stating that the piping frequently breaks and repairs were increasing. The system wasn't tracking where repairs occurred or why the repair was needed. A more in-depth analysis revealed that the repairs were not the result of aged pipes and repair costs were relatively cheap. Instead of replacing the system, asset management was applied to identify a different approach by adding new valves, hydrants, loop lines and repairing one area. Asset management resulted in less money spent and better customer service.

In the second case study, a system was considering replacing the pipes by starting at one end, and continuing throughout the system. This process would have taken 17 to 25 years. Once asset management was applied, it became evident that a better solution was to prioritize pipe replacement by identifying critical pipes and assessing longevity.

In the third case study, a system wanted to replace all concrete interceptors due to failures, but it was too costly. The system applied asset management to identify operation and maintenance practices that would extend the life of the interceptors.

Asset management provides the answer to many situations.

#### Q&A with Jeanette Klamm and Heather Himmelberger:

To Jeanette – There needs to be a champion – who was your champion and who keeps the process moving?

J – It was Jeanette herself that did it – biosolids wise. Assistant director is driving force for ISO 14001. Administrator was Jeanette (planning audits, etc), but champion was Assistant director. Really need a champion that will support this all the way through.

Have you used CMOM? Jeanette – Looked at CMOM, but do not actually have it implemented, but are probably doing most of the requirements. Not officially in CMOM program.

On topic of CMOM – will there be push toward CMOM compliance and how soon?

Federal gov't response – probably won't take to federal regulation level. Probably not CMOM regulation nationally – Steve Allbee response. States can make choices on what they do. Better chance national regulation on asset management, With that said, national regulation on asset management not seen coming any time soon.

Capacity development program. States will define what capacity is and follow Washington state. New Mexico picked 10 things they would like water systems to do. Asset management is one. Try to define what capacity is. Looking to put more structure on what it means to have capacity.

Gasby 34 – general direction regarding infrastructure. Transparency of infrastructure system – shape it is in and what future looks like. Easy to work through without doing anything. Requirement is there, but not a lot of teeth in it. Need to be clear to public on what is going on with infrastructures in this country.  
Not a driver of asset management. Kind of future driven.

Jeanette – Did you do both EMS at same time (OSAS 18001 and ISO14001). – Yes. They became as one. Everyone just knows it as “management system”. Why did you pull them in together?  
It just really fell together like this. Not a lot of initial planning. It just kind of landed that way. Cost was a factor as well.

What is KEMA? Jeanette- that is her auditor. Is OSAS 18001 a recognized, certified standard? It is assessment series and is recognized as of 1999 and just changed to 2007. OSAS is British.

Jeanette has management plans, goals and targets, auditor reports on website – very transparent

Three new ISO standards coming out in February. 24510, 24511, 24512 – Basically asset management standards for water and waste water utilities. Not real detailed. More detailed than 14001. Current stature does not include certification and audit process, but it will after 3 years. Few people seem to know about this. - Steve Albee announced this.

What type of IT system are you using – to Jeanette? Cartograph, access database? Manual is word document. Some that are access database that IT dept has helped to put together. Can do it however you want. Want it in a database so you can track where problems are. This helps to determine root cause of problems. Still a work in progress. Pretty in depth GIS system. Management system itself – you can do it however you want. Not really that complicated.

GIS discussion. In Lincoln Nebraska, they converted all CAD to GIS. GIS is a wonderful tool. Each line has data attached to it. They have database that has information on all work orders, broken mains, etc. Very extensive system.

Mapping using GIS is very valuable tool.

MO rural water association – person that does GIS mapping for state’s very small systems, but have only one person for entire state. GIS mapping is needed for smaller communities. Anyone that can help with assistance would be great (e.g., community colleges, etc.).

GIS makes it easy to keep maps updated. GIS is even used for biosolids program. Keep application information in database.



Heather - Overseas in New Zealand – have handheld GIS systems and when you go out to work on a job, there is a series of questions to answer. Truly phenomenal system that is not that expensive. This sends back real-time information back to engineers. Not a real time consuming process. It seems that use of hand-helds is the wave of the future.

Summary of tools

EMS

National biosolids

OHSAS

Asset Management

CMOM

GIS

Risk Management tools

Asset management being used by several utilities.

15-20 information management systems that have been available over the last 15 years, but these systems are going through transition to asset management type systems

CUPS is an asset management system coming out that will focus on smaller systems. (Checkup program for small systems) – Not meant for 100,000 person system, but very useful for smaller systems. Target audience is around 3300, once you get to 10,000 probably need to go to something else.

TEAMS – Maryland Center for Environmental Training

Vulnerability assessments – How many people have used this and put into asset management. Small systems exempt. Some larger systems are doing it, but it is a mixed bag. If vulnerability work and asset management work are not aligned, you have probably done something wrong.

State of PA and EPA are doing pilot project in needs survey to asset management program.

Barriers to doing an EMS and Asset Management:

- Staff thinks they are doing as much as they can and staff sees it as just more work – busy work – May be paradigm shift.
- Everyone so busy can't do any more. Don't do more, just do different.
- People don't like change! Change is difficult.
- Finding a champion. Finding a way to break the cycle and having the time to do it yourself. Keeping it moving. May be worth bringing someone in to help do this. Have to commit to keeping this sustained. People have been through several of these programs and people think it is just another one.

People are doing a lot of the EMS already, it is a matter of putting it together. Don't hire someone to do it for you, but help to guide you through this.

### **Harvest Collier: PEER Centers, a Resource for Improving the Management Process**

The PEER (Public Entity Environmental Management System Resource) Center provides Environmental Management System (EMS) information and resources for public organizations and entities. Public entities include local governments, municipalities, national colleges and universities, military installations, K-12 schools, government and other public, non-profit organizations. PEERs has eleven local resource centers nation-wide that provide public entities with guidance, training and technical assistance.

An EMS is a tool to help organizations prevent pollution, operate more efficiently, lower operational costs and improve their environmental performance. The EMS provides a systematic way of managing an organization's environmental affairs and focuses on continual improvement of the management system in order to reduce negative impacts on the environment. An EMS can also improve public image and improve relationships with regulatory agencies, while opening new national and international business opportunities.

The PEER center specializes in building partnerships, conduct EMS workshops, hosting EMS Conferences, making conference presentations, offering on-line courses, performing consulting and specialized training, participating in community events and the National EMS Workgroup in order to promote EMS.

Positive things about EMS

- 1) increasing environmental awareness
- 2) embracing differences -

National help through PEER Centers – 11 centers across country – Peer Centers provide public entities with guidance, training, and technical assistance

**[www.peercenter.net](http://www.peercenter.net) – great resource**

Graduates at University of Missouri – Rolla are more marketable with training and knowledge of EMS and sustainability

How do you find the best person to help with this? – Hire a consultant on the basis that you would actually hire this person to be a colleague on a daily basis. Use the same criteria.

Questions/comments for Harvest Collier:

Logo created - is that a common thing for different organizations to do?  
Few organizations that have developed logos. Many have a website that says that is what they do. Implies relative quality of what you do.

Easy to put on information organizations send out. Helps to get buy in.

University of Missouri - Rolla becomes University of Missouri of Science and Technology January 1<sup>st</sup>

How you see interface between asset management & EMS and how they relate to each other?

Used to be very quantitative and lay out list of things that need to do. Learn to work these things in on a more casual conversation. Talk about what the concerns are in a casual way. Very quickly get to things that people wish were corrected in their organization and then it starts to catch on. Cost and people to get things done are the two biggest barriers to getting things done.

No magic bullet for this stuff. Must continue to work at it and can see improvement.

You need to measure the success and recognize there is a way to monitor and measure and eventually you will get there.

#### PEER Centers

Peer center services are not free. Would people take advantage of this? If offer credits to operators, then MO could give vouchers for that. Missouri has a voucher program.

What is typical fee for PEER center. Try to cover costs. Training session ½ day – 2 people \$1,500. Covering expenses is an important thing for PEER centers to do. Prices can be negotiated. Prices are cheap compared to consultants.

Helpful to have someone help you that has been through the process themselves. If person has been through the process themselves, they can share experiences, etc. This can't be over emphasized. The advantage of using people that have "been there, done that" is extremely important.

Any utilities that would like to try and go back and implement or think about implementing their behavior using EMS?

Goal of Lincoln Nebraska is to move toward an asset management plan. Spending about 2.5 million on replacing pipes, but are they the right pipes?

This sounds well and good, but are you going to guarantee this is going to work? If you go over what you are going to try and do and make that clear, usually that question goes away. However, no guarantees can be made.

Does PEER Center have a train-the-trainer program? Yes. Resource may not already exist, but PEER Center can tailor to specific needs.

#### FROM FLIP CHART – RESOURCES

- PEER Center

- MEMP
- Web resources
- County Extensions
- Finance Centers

## **Track Topic: Reducing utilities' future capital costs**

### Problems, Challenges & Obstacles

- 1) Need better means to utilize regional management solutions as a way to reduce capital and operational costs.

#### ***Challenges Specific to Small Systems***

- Small systems cannot afford future capital cost reduction efforts. There's no economy of scale.
- Small communities are resistant to raise rates.
- The need for Regional management solutions especially applies to rural communities.
- Small communities experience a quick turnover in staff. Capital costs can be reduced by generating a means to better utilize regional solutions.
- Smaller communities need to train operators so that they are better equipped to run the system or facility. Smaller communities also need to have a means to offer training to city council members so that they are better equipped to make decisions regarding operation and maintenance of infrastructure. Training is specifically needed in the areas of: lagoon operation, activated sludge and financial hardship.
- The life of the infrastructure can be longer than the known projected population, and, therefore, it's hard to identify the right scale to build for.
- Systems are facing overcapacity with decreasing populations, and little information is available on the best means of managing this.
- In areas where population decreases, small communities don't have the knowledge/technical expertise to predict whether shutting off areas of the system will lead to cost savings. Based on declining populations in small communities, an analysis is needed to determine where decommissioning is most efficient. Technical assistance is needed to accomplish this analysis.
- We need to consider building smaller plants around a city (example: Duckett Creek Sanitary District), and build the treatment plant within the subdivision.

#### ***Challenges Faced by Systems of All Size***

- Problems facing water utilities include: aging infrastructure, lack of funds to replace aging infrastructure, losing workforce to retirement, unaccounted water loss due to leaks and diversions.
- Rate increases don't rise at consistent rates. Therefore, it's a challenge to perform long-term planning. Communities need assistance to identify an appropriate technology for its size.

- Compliance timeframes should be flexible/extendable and should allow for longer timeframes. If cities were allowed 30-40 years to come into compliance, the problem wouldn't be difficult to change. However, cities face pressure from EPA to fix it more rapidly. Cities are more open to address problems in stages, as opposed to everything at once.
  - New approaches, including green infrastructure, are not clearly allowed or encompassed in local regulations or quantified as compliance measures.
  - Enforcement agencies must be patient enough to allow for green alternatives. For example, a fully developed new tree canopy can reduce CSOs, but will take twenty years to have an impact.
  - Utilities face competing goals. Balancing more than one end goal (water quality standards, public health) is difficult.
  - Cities and communities are asked to expand tertiary treatment use to stormwater, watersheds and CSOs, but doing this simultaneously is not affordable.
  - Private companies should be better utilized through contracts to manage systems, in order to predict "automatic" rate increases to maintain systems.
  - Use of existing capital should be maximized. In order to do so, there needs to be a stronger emphasis and greater resources dedicated towards leak detection for drinking water and wastewater, both from the utility and endusers.
- 2) Better communication with the City Council and the public is needed to raise awareness of the value of water.

### ***Challenges Specific to Small Systems***

- Smaller communities don't understand the basics of water, where their water infrastructure is inadequate.
- Smaller communities need to train operators so that they are better equipped to run the system or facility. Smaller communities also need to have a means to offer training to city council members so that they are better equipped to make decisions regarding operation and maintenance of infrastructure. Training is specifically needed in the areas of: lagoon operation, activated sludge and financial hardship.

### ***Challenges Faced by Systems of All Size***

- Public awareness of the need for clean water is low and lacks acceptance.
- The public needs to be educated on the benefits of system upkeep so that there is not a reluctance to pay for infrastructure changes.
- Involvement in public meetings, EPA oversight, city council meetings and interest groups needs to increase.
- Utilities face competing goals. Balancing more than one end goal (water quality standards, public health) is difficult.
- Drinking water and wastewater industries are in competition with other needs in the communities. Better communication with the city councils and the public is needed to raise awareness.

- The role of both wastewater and drinking water infrastructure should be emphasized to highlight contributions to clean rivers and streams, and safe drinking water. Advertising could be part of the solution to increasing communication.
  - We need more scientific analysis on hypoxic zones in order to support current regulations or formulate new regulations. We lack the scientific evidence necessary to connect human causation with hypoxic zones, as hypoxic zones have existed since the beginning of time.
- 3) Need to manage using a watershed approach.

### ***Challenges Specific to Small Systems***

- Small communities experience a quick turnover in staff. Capital costs can be reduced by generating a means to better utilize regional solutions.
- The need for Regional management solutions especially applies to rural communities.

### ***Challenges Faced by Systems of All Size***

- In order to address nonpoint sources, such as stormwater and sewers, we need to put money on the “end game,” or the result, which is watershed treatment.
- A watershed approach should be implemented which addresses nutrient removal, nonpoint and point source issues. In general, watershed permitting is viewed as a valuable means to reduce capital costs.
- Better assessment needs to occur in order for regulations to keep up with changing times. Factors to consider include: managing watershed needs, thinking holistically and managing competing goals.
- EPA must set measurable goals and provide industries with the option of how to reach that level. EPA has seen instances where utilities have met their obligations by installing non-point controls. Others believe watershed permitting doesn’t seem feasible due to economics and the way the standards are written.
- There’s a need to meet ambient water quality through watershed planning and managing watershed needs.
- Nonpoint sources are currently not regulated, but point sources are regulated.
- Watershed groups need to give greater consideration of how to incorporate non-point sources
- Additional information is needed to determine whether non-point source issues can be addressed through source water issues.

- 4) Need to consider variability in commodity costs in planning future capital costs.

### ***Challenges Specific to Small Systems***

- Developers don’t think about/communicate future costs to those responsible for maintaining it. Developers pay for additions, and the town is responsible for maintaining it.

### ***Challenges Faced by Systems of All Size***

- The price of materials and commodities will increase due to inflation. China and India are facing even more rapid growth, which will trigger more rapid inflation rates for construction materials. Fixing the problem as soon as possible saves money overall due to inflation of construction materials.
- Upgrading of infrastructure over time will result in higher costs due to external demands outside the USA for raw materials. Inflation is also a factor.
- In the United States, utilities don't have the opportunity to advertise their services. In countries such as Australia and China, advertising is done to increase and raise awareness. Utilities can't afford/don't have the opportunity to use the media to communicate the need due to resources and lack of expertise with the media. EPA may have the capability to do so. Utilities need a stronger media connection to communicate value of utilities.
- Future costs are increasing, leading to the challenges of: honestly capturing costs, prioritizing upgrades, and improving technology while reducing costs.
- China/India resource consumption will significantly drive up future consumption costs. We need to start thinking and engineering things differently.

### **Solutions/Pathways to Progress**

- 1) Better means to utilize regional management solutions is needed to reduce capital and operational costs.
  - Barriers in resolving this problem include: Share purchasing, sharing equipment, collaboration of several cities, interest groups have different problems and perspectives, sewer district failure, lack of funds to pay higher salaries in rural communities. Solutions include: Education (particularly in rural areas), maximizing allocation of money, consideration of a 1% sales tax, collaboration, applying local and source treatment, increase in central and decentralized management.
- 2) Better communication with the City Council and the public is needed to raise awareness of the value of water.
  - To overcome a lack of interest, initiate advertisements
  - To overcome a lack of education, create opportunities to seek education and use a business approach.
- 3) Managing using a watershed approach has many benefits.
  - Implement green infrastructure.
  - Conducting better case studies, such as Chesapeake Bay and Milwaukee, will generate and encourage exchange of water quality monitoring data.

- Generating and sharing water quality data and watershed permitting will assist in defining watershed compliance local authority.
  - Watershed permitting should establish criteria to ensure measurable benefits.
  - The agricultural community can be legislated through intra-government cooperation.
  - To implement a watershed approach, public education and watershed funding should occur.
- 4) Variability in commodity costs in planning future capital costs must be considered.
- Education and research will reduce volatility and uncertainty of future politics.
  - Increased cooperation will improve current budgeting practices.
  - Innovated technology should be introduced to replace what's not available
  - Available funds should be prioritized.
  - Regulatory agencies should switch mentalities to consider time present worth and avoid proposing solutions which force low capital expenditure.
  - Education should be promoted to overcome the conflicts of political objectives and create economic and sustainable solutions.

### Turning Ideas into Action

- 1) Challenge: Better means to utilize regional management solutions is needed to reduce capital and operational costs.

Two Ways to Overcome:

- a. Maximize economies of scale

How do we maximize for economies of scale?

- Resurrect 208 area-wide management plans.
- Regional communities should develop one, standardized product.
- Provide tools to help small communities make decisions today that will position them for the inevitable growth and changing infrastructure needs that will accompany it.
- Develop trust fund for capital finance.

- b. Regionalize community education

How do we get together to regionalize communities on education, issues and solutions?

- Resurrect and review 208 area-wide management plans and add those to their mission.
- Improve cooperation between EPA and states.
- Improve regulatory certainty in the wet weather areas, especially SSOs.
- EPA, WEF, States, utilities should develop ad campaigns



- USDA-RD should incorporate small town documentary to show benefits of sharing.
- Encourage SRF to emphasize regionalization (as done in Drinking Water)

2) Challenge: Raise City Council and public awareness of value of water

Two Ways to Overcome:

- a. Federal, state, local agencies run ad campaigns to sell the same message

How do we develop an ad campaign to sell the same message?

- EPA, WEF, States and utilities should survey existing ad campaigns
- EPA, WEF, States and utilities should define the message more specifically.
- Market green infrastructure. Successful green infrastructure programs have high visibility and positive impacts on public opinion. Academia should work with communities to conceptualize and apply green infrastructure alternatives.
- Hold a national meeting as a kick-off for establishing/advertising the value of water.
- Have a national Water Day/Boost water week.

- b. Use a business approach to educate (Asset Management)

How do we develop a business approach to educate council members?

- EPA, States and WEF should provide them with scripts to inform public
- WEF, AWWA, State associations should develop or create documentary of a small community going through this process.

3) Challenge: Managing using a watershed approach has many benefits.

Two Ways to Overcome:

- a. Generate and share water quality monitoring data (Chesapeake, Milwaukee)

How do we generate and share water quality monitoring data?

- EPA and States should publish existing water quality monitoring data on the internet, including information pertaining to MS4s, TMDLs and Storet.
- EPA and States should organize existing data on the internet.
- Use a pollutant-loading, cap and trade watershed approach (like carbon trading)

- b. Legislate unregulated agricultural community

How do we promote legislation for the unregulated agricultural community?

- Regulated community/NACWA should hire lobbyists
- Unregulated agricultural community should be informed and educated through impending legislation.

- Regulatory agencies should inform and educate legislators of agricultural communities' impact
  - EPA and NGOs should encourage case studies for externally organized businesses in the community
- 4) Challenge: Variability in commodity costs in planning future capital costs must be considered.

#### Two Ways to Overcome & Solution

- a. Innovation/new technology to replace what's not available

What can we do to facilitate new technology to replace what will not be available?

- Encourage EPA pilot studies for non-material intensive infrastructure solutions
- Research the scope prior to implementing new technologies. Include process and procedures.
- Have self, state and EPA identify progressive communities best equipped to execute case studies
- Reward consultant and utility innovation fairly with respect to benefit provided.
- EPA should invest in applied research.
- EPA and states should provide grants
- Cities should adopt new technology as part of their compliance program.
- Academia should research new materials and how to better maintain existing materials to extend their life.

- b. Better planning/prioritize spending

How can we more accurately estimate lifecycle cost?

- Encourage academia/universities to research and develop workshop for communities and monitor case studies
- Interest groups should determine existing databases available, and develop new database
- EPA and universities should work to improve our ability to model and predict lifecycle of assets on a site specific basis.
- Regulators and universities should change approaches to planning and regulations using knowledge from research.
- Consultants, EPA should look for cross discipline cooperation (economics, engineering and forecasting).

#### Presentation Summaries

**Toby Frevert: A State Perspective on Challenges in Small Communities**

Small communities face many challenges which need to be considered when incorporating sustainable approaches. The number of miles of sewer per household is probably greater in smaller communities, which contributes to greater costs. It can be difficult to predict population growth in smaller communities. Therefore, this leads to a bigger expense for a smaller population base. It's difficult to keep city councils up to speed on what needs to happen to address infrastructure maintenance. Extra effort may need to be dedicated towards small communities in order to introduce sustainable infrastructure.

**Scott Rainey: Washington, Indiana Utility Needs**

The City of Washington has been working to obtain an approved Long Term Control Plan (LTCP) since 2002.

Under Indiana Department of Environmental Management's new regulations, all flows generated from up to one-year, one-hour must be eliminated or captured for treatment at the biological treatment facility. The cost of implementing the LTCP is estimated to be \$90 million (2007). Washington is also making upgrades to the wastewater treatment facility and plans to make changes to the combined sewer to resolve 45 to 80 CSOs per year.

The economic impact of this work will be high, with a calculated Wastewater Cost per Household Indicator of 6.6% of the median household income. Due to the high impact rating, Washington plans to propose a twenty year implementation schedule. Upon completion of major milestones, the LTCP will be updated and revised to reflect the new conditions present in the system.

The City Of Washington plans to prepare a Use Attainability Analysis and request a Wet Weather Limited Use Subcategory. The city plans to identify and implement the maximum degree of treatment that can be feasibly accomplished without causing widespread economic hardship to our citizens.

**Dan Murray: Aging Infrastructure Anticipated Research and Development in EPA**

EPA's goal is to conduct research and demonstrations and develop technical guidance to transfer *innovative* technologies and approaches for more cost-effective operation, maintenance, repair and replacement of aging and failing drinking water and wastewater systems and development and application of advanced designs and management approaches for drinking water and wastewater systems. Research focus areas for aging water infrastructure in EPA's Office of Research and Development include: inspection and condition assessment, system rehabilitation (Repair to Replacement), advanced design and management concepts and wastewater and water reuse treatment technologies. Examples of projects include: "State of the Technology" Assessments, including internal camera inspection technologies, rehabilitation of

house laterals and sewer liner retrospective; Innovative Technology Demonstration Programs demonstrating emerging inspection and monitoring approaches and new repair, renewal and replacement materials and techniques; Applied Research and Field Application such as integrated system management and decision support, system failure analysis, modeling and forecasting, and; basic research and bench or pilot scale testing, including advanced hydraulics for sanitary sewers and new sewer designs and system configurations. Recent studies sponsored by ORD include: a rain barrel project to determine reduction of inflow in Kansas City and developing drinking water materials. ORD also has several projects being conducted to assess quality assurance.

EPA will make the results of studies relating to sustainable infrastructure available on their website, which is accessible to both small and large communities. Information can be found on the EPA website by searching “aging infrastructure.” ORD also plans to distribute information by presenting at conferences sponsored by partners.

Q&A:

Question 1: How are you involving academia in your research?

Response 1: Several Universities present at meetings, including Louisiana; Plans to fund other studies in 2008 and contracts have been rewarded.

Question 2: Once the studies are performed, how will EPA distribute the information? It will be especially helpful for small communities. Will you actively reach out to communities?

Response 2: Information will be available on website. EPA will not get a list of every utility and send information to every utility. However, EPA will speak at events presented by partners. Information on website can be found by searching “Aging infrastructure” on EPA website.

Question 3: Consultant hopes and encourages EPA will look into quality assurance.

Response 3: EPA has several projects being conducted to assess quality assurance.

**Mark Boner: Simple Hydraulic Control and Treatment Solutions to Wet Weather Pollution and Other Wastewaters: CSOs, SSOs, Stormwater, Industrial Wastes and Reuse**

WWETCO introduced a new technology that uses a ball filter media, which can be applied to CSOs, stormwater and tertiary treatment. The technology uses a high rate, high efficiency compressible media filtration and has low flow backwash requirements. Other features of the technology include: passive hydraulic control, no use of mechanical parts, operates on drainage hydraulics, compressible media, higher mass removal, breakthrough protection, efficient backwash, can reduce capital and operating costs, and does not hinder existing system capacity.

The media operates such that water is pumped through the media. The media shoots up and back down, operating similar to a washing machine. A patented hydraulic flow meter is also applied. The air does the work, contributing to an efficient operation. The media is clean in about 20 minutes, regardless of the amount of pollutants in the water.

Capital Costs are approximately \$0.05 per gallon for tertiary treatment, \$0.07 per gallon for primary effluent, \$0.10-\$0.15 per gallon of capacity for screened and degritted CSOs. Operating costs are \$3.00 per million gallons treated.

Pilot testing has been completed in several areas. Pilot testing for CSOs was performed in Atlanta, Georgia and saved approximately \$10 million. Pilot testing for tertiary treatment occurred in Richmond, Virginia and was used to treat waste from a secondary clarifier. Pilot testing for stormwater runoff was applied in Columbus, Georgia, where the media was combined with UV filtration to clean a creek after it rains.

### **Bill Abolt: Green Infrastructure and Sustainable Approaches for Meeting Infrastructure Needs**

Sustainable development applies integrated solutions to solve real problems. Sustainable development optimizes resources and deploys them to create lasting economic, environmental and community value. Green infrastructure is a key element of sustainable design and provides multiple benefits, including: pollution reduction, increased stormwater control, cost control, enhanced aesthetics, and increased open space. Green infrastructure strategies can be incorporated into both site specific developments and area-wide plans. However, more needs to be done to recognize, quantify and realize the specific values that are created by sustainable development.

Shaw environmental has been involved with numerous projects relating to green infrastructure, including riverfront redevelopment implementing green concepts in Aurora, Illinois. Key strategies used to achieve riverfront redevelopment include using enhanced riverfront as an amenity, improving water quality, remediating brownfields, and eliminating obsolete infrastructure. Aurora worked with the state to identify new tools for sustainable redevelopment. Aurora is redeveloping 579 acres by creating a rooftops to rivers stormwater corridor, constructing a naturalized treatment wetland, promoting neighborhood best management practices, alleviating combined sewer overflows, increasing stormwater detention capacity, creating urban wildlife habitat and fostering environmental education. Shaw Environmental recommends using an integrated process, assessing barriers and constraints, starting early, involving and educating stakeholders and analyzing costs and benefits to launch a redevelopment project. Advanced redevelopment can be made possible by designing regulations that support sustainability, creating standard approaches, measuring results, and assessing transaction costs.

### **David Kroon, P.E.: Extending Pipe Life**

Corrosion control is key to effective infrastructure management. If the pipe doesn't break, it doesn't need to be fixed. EPA identified corrosion as a major mechanism of pipe deterioration in its White Paper, "Improvement of Structural Integrity Monitoring for Drinking

Water Mains” March, 2005. Internal and external corrosion is caused by aggressive soil and/or water, microbial activity, stray currents, oxygen concentration cells and bimetallic connections.

Internal corrosion is controlled by mortar linings and chemical treatments such as orthophosphates. Ways to prevent and control external corrosion include conducting condition assessments, using cathodic protection, applying local hot-spot protection, managing stray current control and completing corrosion monitoring. Condition assessments include failure analysis, soil and water testing, physical inspection whenever pipe is exposed, testing of coupons from service taps, and pipe corrosion surveys to assess the remaining life.

When repairing, rehabilitating or replacing pipes, it’s important to optimize timing. If pipes are maintained too late, it becomes more costly to maintain or manage failures. If pipes are maintained too early, it’s a misuse of resources. Taking advantage of Public Works opportunities that expose the pipe, including taps, line extensions and other utility work can reduce costs.

Corrosion is often the root cause of pipe failures. Corrosion is predictable. Unless actions are taken to prevent corrosion, it’s inevitable. Proven, cost effective corrosion control strategies exist. When suitably designed, corrosion control is construction and maintenance friendly.

Q&A:

Question 1: How do you identify breaks?

Response 1: Find your failures. Whenever a pipe is exposed, one should assess the situation and record it.

## **Track Topic: Identifying sustainability solutions for small utilities**

### Problems, Challenges and Obstacles

#### *Challenges Specific to Small Systems*

- Small communities that receive loans may not have the revenue to pay back the loan at the rate anticipated due to declining populations. In addition to the loan for capital costs, the facility needs to have revenue available for managerial and operational costs.
- Operators and City Council are over-extended in small communities, and may not be able to provide the attention the system requires.
- Small systems have difficulty obtaining loans.

#### *Challenges Faced by Systems of All Size*

- Infrastructure is not a high priority in the federal budget. The United States has increased the defense and military budget, as well as aid due to natural disasters, such as repair from Hurricane Katrina. As a result, the U.S. has driven the debt to the point where it has accumulated \$150 billion in interest. EPA has a limited budget.
- Drinking water systems need to be fully-functional to have value. If the system does not function properly, the end result may not be consumable. The return of investment is all or nothing.

- Empirical information, rather than anecdotal information, is needed to make decisions on how to proceed. Most of the information we have today is anecdotal.
- If a public water system has acute violations and changes need to be made to the public water system, the need for funding becomes more urgent. However, it is difficult to obtain funding immediately, regardless of the situation.
- The City Council is held responsible for the public water system, but the City Council members need to be better educated and/or hold more expertise in order to make decisions about how to maintain public water systems.
- State regulatory agencies have attempted to coordinate with City Councils regarding non-compliance at public water systems, but don't always get results. More individual attention is needed from the regulatory agency to perform compliance assistance with the City Council and operators, but there isn't enough funding.
- Systems in the West are willing to pay more for water because they recognize the water quantity problem. However, the Midwest faces water quality problems, and the public is not as accepting of rate increases.
- Utilities face competing interests. Sewer rates are often cut in order to increase drinking water funding.
- Infrastructure is aging, and construction costs are increasing.
- Communities are having difficulty keeping up with new regulations.
- Decisions regarding infrastructure improvement are delayed due to political barriers. Elected officials are hesitant to commit to infrastructure change.

#### Solutions/Pathways to Progress

- Operators need to be better equipped for the position. Ways to improve operator skills include: Increasing salaries, providing funded training, requiring additional hours of training, setting a higher requirement for math skills.
- Methods of communicating risk need to be improved. Currently, exceedances of the Maximum Contaminant Level for public water systems are reported in the Consumer Confidence Report (CCR) and Public Notice (PN). However, regulatory agencies cannot rely on a mail-delivered document to communicate risk. Additionally, the CCR and PN needs to be written so that the right message is portrayed. The CCR is underutilized as a means of communicating with the public. Regulatory agencies need to improve risk communication.
- Drinking water quality has been highlighted in the news more frequently. Communities should take advantage of the publicity and increase discussions about their water.
- The City Council is held responsible for compliance of public water systems. Operators of public water systems should be held responsible for non-compliance in addition to the City Council.
- Capacity development leads to improved compliance, but mechanisms are needed to expand the program
- Training tailored to local officials should be available.
- Raise public awareness about the value of drinking water.

- State Revolving Fund (SRF) should be better used. Funding opportunities should be consolidated. Private industry should have the opportunity to use SRF. As a loan condition, board members and local officials should participate in a retreat.
- Facilities should implement asset management.
- There should be a System Management Intervention Program to assess consolidation as a means to increase protection of public health protection, compare economic advantage, and ensure wells are abandoned properly.
- The New Systems Program (part of Capacity Development Program) should work to prevent non-viable systems
- Alternative technologies should be promoted, including point-of-use devices and bottled water.

### Turning Ideas into Action

#### *Challenges Specific to Small Systems*

- Small systems should consolidate with larger systems to improve water quality and/or keep costs down. The number of small systems that purchase water is increasing because it is getting too costly to treat the water within the community.

#### *Challenges Faced by Systems of All Size*

- EPA, States and industry need to promote and utilize the State Revolving Fund (SRF) so that it is being used to its full potential. SRF provides funding at the lowest cost.
- Training opportunities should be expanded to allow for varying types and sizes of systems.
- Asset Management should become a necessity, rather than a novelty.
- Current operators and City Council should document managerial and financial decisions so that future operators and City Council can make more informed decisions.
- Regulatory enforcement should transition to become more focused on acute violations, and less focused on chronic violations.
- EPA and the States need to further promote the Operator Certification Expense Reimbursement Grants Program
- “Personalized” information should be distributed to customers.
- Infrastructure needs to plan for both procedural and operational continuity by diagnosing gaps and identifying mechanisms, including identifying the cost to replace key staff and costs of services provided by volunteers.

### Presentation Summaries

#### **Don and Helen Howard: What Can Work for the Small Utility**

Don and Helen Howard relayed how they helped establish a sewer district in order to save their family farm. The sewer for the farm and surrounding lots discharged into Labadie Creek. Purchasers of the lots, like the Howards, were not aware of the lack of a sewer system at



the time of purchase. The Howards established the sewer district and water association in 1991. It took ten years for the community to pay off the loan for changes to the sewer system.

The three biggest challenges the Howards experienced in implementing the new sewer system were: 1) Securing funding for the sewer systems. Grants were provided to assist with installation of the new sewer, but the community still had to increase sewer rates by 40% to pay for the changes. 2) Managing funds. Once funds were secured to build the sewer system, people would not pay their sewer bills, which led to lack of funds for operation and maintenance to the system. 3) Meeting ammonia limits, due to interference from a pet food plant. 4) Lack of expertise to keep up with the regulations. The community had to hire a lawyer and engineer to manage this.

The Howards also assumed the responsibility of the public water supply operator(s). The Howards have been able to run it with some assistance from MDNR, but fear that a new operator will not step up once they are no longer able to run the system.

One challenge the community faced was determining how to communicate risk attributed to violations under the Total Coliform Rule. The Howards found that people did not read the Consumer Confidence Report (CCR), and so they began to report coliform results at monthly community meetings.

### **Frank Dunmire: Overview of Challenges Facing Small Utilities in the 21<sup>st</sup> Century**

The challenges small utilities face include: 1) Aging infrastructure; 2) Cost of materials; 3) Operation management; 4) Financing and securing funding.

Most sewer systems were put in before the Great Depression. Failures in aging systems are often tied to improper installation. For example, wood was one of the first materials used for sewer pipes. In the 1930s, cast iron began to be used, but snapped easily. In the 1950s, ductile iron was used, which triggered significantly less failures. Nowadays, plastics are often used because it is resistant to snapping, and is low cost.

Financing is difficult to secure due to competition of the amount of communities that apply for grants, and the limited funds available. Funding agencies are starting to work together and provide incentives for private sector to invest in rural water districts (RWDs). The disadvantage to RWDs is that they have defined boundaries and cannot grow. To optimize resources, board member training, high-level operators and formal asset management plans are recommended.

### **Dennis Siders: Small Utility Needs from a Finance Perspective**

Small municipal systems are most at risk and have the most difficulty sustaining their infrastructure. Most towns that have a population below 2,500 struggle with staffing and resources of utilities, based on experience in Missouri. These systems face personal, accounting, political and economic barriers.

Commonly in small communities, there is only one employee, the City Clerk. Most clerks also operate the municipal utilities. Many clerks work part time, cannot keep up with computer technology, and do not have an accounting background. This presents a personal barrier.

Frequently, municipal water and wastewater revenues and expenses are combined in the General Fund. Water and wastewater entries are not separated. Replacement funds (if any exist) are not earmarked for water and wastewater. Small municipal systems do not know if they are making or losing money. Decision makers do not have the information needed to make good decisions. These present accounting barriers.

Rate increases are based on political promises and/or the perceived ability of the residents to pay. Repairs are paid out of the general revenue fund and compete with other priorities. Major repairs and maintenance are usually delayed in the interest of receiving a grant. These present political barriers.

The median household income in the United States is \$58,526. In three different small towns in Missouri, Queen City, Brashear and Clifton Hall, the median household income is \$20,875, \$21,750 and \$26,250, where the water bill averages \$34.80, \$36.25, and \$43.75, respectively. When utility costs are high where the median household income is below average, this presents an economic barrier.

Utilities in small communities require effort to be sustainable. There is also a need to improve utilities in communities that have a declining population. By collecting information in useful, financial reports, communicating effectively with governing boards and the public, and examining funding sources, particularly for rural communities, utilities can become more sustainable.

#### **James McGoff: Gaining Access to Capital/Overcoming Funding Barriers**

The Indiana Finance Authority formed in 2005, and combines all finance entities into one, including State Revolving Funds (SRF) and Brownfields. The Indiana Finance Authority identified *System Development Charge* as a problem which will improve financing when corrected. *System Development Charge* is a one-time charge billed to new customers (or developers) for the cost of their capacity, and can also be billed to an existing customer if additional capacity is required. It's used to finance capital projects that expand system capacity. *System Development Charge* can occur as a result of connection charges, hook-on fees, tap fees, impact fees, capacity fees, availability fees and contribution fees.

When implemented correctly, System Development Change can reduce the impact of growing utility rates. This can be accomplished by planning for major system expansion to minimize debt, recover equitable capital costs, and maintaining cash reserves.

Sources of grants include: U. S. Rural Development, Federal Earmarks, Housing and Urban Development via state authority, the Economic Development Administration, and the State Revolving Fund (SRF). SRF funding is limited. However, it has an impact. In 2007, drinking water and wastewater utilities saved \$34,891,293 from using \$177,189,000 in loans.

#### **Robert Dunlevy: Capacity Development Program: Preparing Utilities for the Basics of Sustainable Practices**

The 1996 Amendments to the Safe Drinking Water Act (SDWA) created the Drinking Water State Revolving Fund Loan (DWSRF). The DWSRF created several mechanisms, which promote sustainable infrastructure. The DWSRF created loans and set-asides for Public Water

Supplies, a program for disadvantaged systems, training and certification of small system operators and assistance to tribal water supplies. The SDWA Amendments of 1996 also direct states to achieve capacity development by ensuring technical, managerial and financial capacity for public water systems. Technical capacity includes concepts such as source water adequacy, infrastructure adequacy, technical knowledge and ability to implement, and having certified operators. Managerial capacity considers ownership accountability, planning, organization, staffing, communication and security. Financial capacity extends to acquiring sufficient revenue for capital improvements and operation and maintenance, credit worthiness, fiscal management and financial controls.

Systems with capacity development are more likely to achieve and remain in compliance, and will be sustainable. Capacity development extends to all four pillars of sustainable infrastructure: better management, full cost pricing, using a watershed approach and achieving water efficiency.

### **Selected presentations to Open Session – All Forum Attendees**

#### **Tracy Mehan: Cadmus and former AA of EPA, former Director of MDNR**

In 2003, the United States Environmental Protection Agency (EPA) released the four pillars of sustainable infrastructure. Sustainable infrastructure is a priority for the current Administrator of EPA, Steve Johnson, and is outcome focused. As a result of the emphasis on Sustainable Infrastructure, the concept of green infrastructure, including low impact development, smart growth, and best management practices has become more emergent. EPA is currently faced with the challenge of working it into permits and enforcement.

This forum focuses on small systems and technologies. Regions 5 and 7 are hopeful that, besides exchanging technologies and techniques, we'll receive active participation and opinions from the attendees.

#### **John Askew: Regional Administrator of EPA Region 7**

This forum is one of five Sustainable Infrastructure conferences. Sustainable Infrastructure accelerates the pay of environmental performance.

Region 5 and Region 7 bring different experiences to the table regarding Sustainable Infrastructure. Region 5 has the tremendous task of protecting the Great Lakes, and also has 20 % of the combined sewer overflows in the nation. R7 has committed to run a satellite environmental finance center. The center is run out of Boise State. It consists of a series of tools to evaluate how best to pay for changes to your system.

What does SI really mean to us? Evaluating and addressing the needs make your system last longer. EPA wants to learn what your needs are and how we can meet them.

EPA hopes to gain input from systems and how best to serve the public from this conference.

**Doyle Childers: Director of Missouri Department of Natural Resources (MDNR)**

Mr. Doyle Childers' presentation reflected both his leadership within the State as a Director and his previous career as a legislator for the State.

Missouri had researched how it could best assist systems fund the changes that were needed across the State of Missouri. They examined these two key questions:

- How do we get the results we want?
- How do we best spend our dollar?

This State had increased its investment in infrastructure from \$10 to \$20 million per year to \$50 million dollars in the 2006 which is still a drop in the bucket when considering their needs are estimated to be \$15 billion.

When asked what lessons that the State had learned that they could give to others about how to meet a sustainable infrastructure, he indicated that they did three things to improve education and communication that led to the results they wanted and an efficient use of their dollar expenditures. These three activities included:

- Putting out more regional and satellite offices to improve the response time,
- Locating an ombudsman in each area and;
- Conducting a compliance assistance initiative working alongside facilities performing more than 5,000 compliance assistance visits.

Key goal is to get systems to recognize how to pay for upgrades. In the past, MDNR invested \$10-20 million in infrastructure. This past year, they released \$50 million to invest in infrastructure. However, \$50 million is just a drop in the bucket. The needs total \$15 billion.

What is the constitutional issue? If money isn't out the door at a certain time, bonds become taxable. Now, we get money and look for projects. We need to change that to where we identify projects and then get the money. MO had \$18 million in bonds that they had to get out this year.

**EPA's Sustainable Infrastructure Initiative**

**Mike Shapiro: Deputy Assistant Administrator, Office of Water, EPA**

EPA is here to learn what SI means to the nation, what the challenges and needs are.

As a nation, we have taken for granted the ability to turn on the tap and get clean, safe drinking water and to manage wastewater in an efficient way.

It is predicted that by 2019, the gap between wastewater infrastructure will be \$112 billion and the gap between drinking water infrastructure will be \$102 billion.

EPA is recognizing that infrastructure management needs to change in order to maintain critical infrastructure. Dramatic impacts related to climate change are expected to impact SI as well. Climate change brings new challenges before us.

Four Pillars of SI were introduced to provide a framework for addressing these problems. The four pillars are: better management, full cost pricing, water efficiency and watershed approaches to infrastructure.

1) Better Management

We need to use resources wisely, and manage for the long run. In May 2007, EPA met with partners to develop ways to better manage water and wastewater utilities.

2) Full Cost Pricing

We need to price items at their real value. This has been a challenge for many communities. EPA has issued a number of documents to help provide a framework for calculating what full cost pricing might be, and how it can be applied to make decisions about managing systems.

3) Water Efficiency

Water Efficiency includes conservation of water supplies and energy efficiency. Less wastewater is easier to manage. WaterSense was designed to educate consumers on how to purchase products and consume efficiently. Products are at least 20% more efficient in water consumption.

4) Watershed Approaches to Infrastructure

The notion of watershed management must be embraced. How can we get the optimal results? How can we manage pollution through trading? How can we best manage the use of water in a watershed basin? As a result, milestones such as green infrastructure guidance have been formulated.

This is a challenge that won't be solved in a year, or probably even a decade. It won't happen unless all of us work together and communicate with the public we serve in order to support decisions which encourage us to plan ahead. We need the support of the public.

## Questions

Question 1: Can we address problems in phases to incorporate SI?

Response 1: With wastewater, we have started with primary treatment and proceeded to tertiary. The measures we take need to be derived in water quality. SI is not a process that will end with a solution for all times, but requires long term discussion and investment.

Question 2: If EPA is successful in implementing the 4 pillars, what is the cost reduction that will occur as a result of the 4 pillars?

Response 2: EPA has not attempted to quantify the cost reduction at this time. EPA has calculated that if costs for systems were proposed to increase by 3% every year, and the 4 pillars were enacted, the \$220 billion gap would shrink by 90%.

**Susan Morgan: PhD, P.E., Southern Illinois University-Edwardsville**

SIUE welcomed the opportunity to showcase both the wastewater/drinking water training facility and green roof design research this morning on the tours.

The audience is encouraged to contact local universities to learn about additional SI-related research and projects that are encouraging around the country.

**Questions addressed to Panel:**

Question 1: When thinking about full cost pricing, participant believes we will have to increase pricing by 100% or more. In regards to the pillars, is it where we need to be focusing? Has EPA done an analysis or economic benefit to project future costs?

Response 1: (Shapiro) EPA has exceptional drinking water quality, where we can go anywhere in the nation and turn on the tap for safe water.

With wastewater, we face more of a challenge. We are now making progress with nonpoint pollution and wet weather, including stormwater and combined/sanitary sewer overflows. We are still considered a leader in regards to surface water treatment. The American public has made it clear again and again that they do want to protect their waters, so the mission is pretty clear in protecting the environment.

Question 2: Directed to Doyle Childers from R5, what words of encouragement/lessons learned can you give to others about how to meet infrastructure needs.

Response 2: (Childers) I have a background with smaller systems, including the Branson area. MDNR put quite a bit of effort into educating the public. They did 3 things to improve education and communication.

- 1) MO put ombudsman out in each area
- 2) MDNR put regional and satellite offices out to increase response time

- 3) MDNR enacted a compliance assistance initiative, trying to work alongside the facilities. MDNR has done more than 5000 compliance assistance visits, where MDNR visits facilities and dialogues with them about moving forward.

## **Using Environmental Management Systems to Lower Operating Costs and Improve Performance**

### **Andrew Kricun: P.E., Camden County, New Jersey Municipal Utilities Director**

Mr. Kricun discussed how through the implementation of an Environmental Management System at their wastewater treatment plant they not only improved the performance of their wastewater system and improved the relations with their community; they also had did this at a lower cost and were able to have three sewer rate reductions in six years of operations. This stunning improvement in performance was accomplished at a facility that was actually considered to be run relatively well at the beginning of their EMS journey.

The presentation of this real case study, demonstrated the significant benefits of using this management tool to get better performance at a lower cost.

We have a shrinking environment: Fixed resources, and a growing population. From the position of a wastewater utilities director, it's essential to optimize environmental performance and meet the obligation to rate payers to minimize costs. This is done through increasing efficiency.

Camden County is the poorest county in the nation. They used an Environmental Management System (EMS) to increase efficiency.

[Refer to Powerpoint Presentation]

Questions?

Question 1: Did you maintain the collection system as well, or just wastewater?

Response 1: Yes, they maintained collection system also. They were concerned about corrosion. They added hydrogen sulfide to minimize corrosion. They also aggressively reduce infiltration and inflow. This was one of the best practices they made to increase efficiency. If you have one gallon of wastewater, and one gallon of inflow, you still have two gallons to treat.

Question 2: What was the median income in Camden, NJ?

Response 2: \$25,000. Comment by participant was made that there are similar areas represented at the conference today.

Question 3: Did you seek certification for ASCII 1401 (XXX Correct name?)

Response 3: They sought certification, but the plant management crew was very resistant to change. They went for the results first.

Question 4: What else was done to the treatment units to apply EMS?

Response 4: Previously, tanks were stagnant and caused excess odor. Instead, they kept all tanks running. Upkeeping of sedimentation tanks decreased odor and moved sludge out faster.

Question 5: Do you have any insight as to what systems can do to improve performance without increasing cost?

Response 5: Implementing an asset management will almost always offset the capital cost. The capital cost to create the asset management plan was offset by the savings from implementing the plan. They were able to borrow from State Revolving Funds to reduce interest.

### **Town Hall Meeting**

**What are the changing roles envisioned in your profession to help address the problem of a deteriorating water and wastewater infrastructure?**

**How can other professions help?**

Doyle Childers, Director of the Missouri Department of Natural Resources

Today, if an engineer wants to try something new, they are punished. The SI initiative will set the framework which rewards engineers for trying something new.

Academia plays a role in testing it. If the design innovation lowers costs, then the innovator gets a sizeable percent of it.

We need more education to communicate the cost of good, clean water.

We also need to focus on how to reward people for doing a better job.

Christy Cooper, Director of Global Strategic Planning, Black and Veatch

Trend 1—We are a wasteful society, and we must change. U.S. households accumulate four times more waste per week than a European family. We are facing enormous costs in addition to climate change.

Trend 2—Asian national economics are flourishing. They want the U.S. consumer market.



Trend 3—Firms are offshoring engineering services. Mega Chinese and Indian companies are tapping into the market in the U.S. These companies are outsourcing the work for U.S. infrastructure to other countries. These firms can operate by charging lower prices. However, the quality of work will not be comparable to work done by firms in the U.S.

In order to combat against this, firms in the U.S. need to

- 1) Get their own shops in order.
- 2) Raise the level of concern regarding climate change, pollution, etc., in our own firms.
- 3) Look for niches and disciplines in expertise.
- 4) View projects on a global scale, not on a case by case basis. The consultant has an obligation to inform the client if they see them going down the wrong road to get the project on the right track.
- 5) Improve workload by tapping into the offshore market on a marginal basis in order to reduce costs.

It's a perfect storm to change internally, or we will become extinct.

Andrew Kricun, P.E., Camden, New Jersey Municipal Utilities

Areas we need to focus on:

- 1) Improve efficiencies.
- 2) Understand value of clean water. Educate public to get support we need to do the work.

Agencies can Assist by:

- 1) Continuing to enforce and maintain the floor for compliance
- 2) Provide incentive for utilities to operate above the "floor" of compliance.

Dr. Mohamed Dahab, University of Nebraska

We need to better define what sustainability is. It must deal with both social and economic constraints.

We need to emphasize:

- 1) Green infrastructure
- 2) Pollution Prevention Programs
- 3) Energy Efficiency
- 4) Sustainability is not a choice. It's an ethic.
- 5) Economic constraints need to be converted into design constraints.
- 6) We need better means to get things from the lab into the field.

Questions

Question 1: How can we promote sustainable infrastructure?

Response 1a: Create national database of problems and solutions. For example, each state could gather its successes, and be compiled into a compendium. Consultants could also contribute. Creation of the database would improve dissemination of information and provide incentive to apply new ideas. (Kricun)

Response 1b: We need to reward people for going above and beyond the limit. Right now, there is little incentive to go beyond what is required. Academia could test to make that determination. (Childers)

Question 2: Can the water industry learn from the energy industry? What is being done?

Response 2: Black and Veatch will look into that.

Question 3: Currently, engineers are hired based on how much experience they have working with a specific technology. The future of engineers will be based on how well they can think differently, as opposed to the same; to think outside the box. Where do you see the future of engineers?

Response 3a: 50% of the workforce at MDNR can retire within the next 5 years. 70% of senior staff can retire. How do we meet that demand? We need to plan for the future. (Childers)

Response 3b: It's important that the entity taking the risk is the best one for taking the risk/most knowledgeable in the subject. We need to find ways to deliver the same services for less. In the US, we aren't producing the engineers needed to meet the work demand. We need to get the word out about the importance of engineering, and careers available in infrastructure. (Cooper)

Question 4: What is the rate that we need to be making these changes at to meet the work demand?

Response 4a: MDNR decided that they can't retain their engineers and keep up with competitive salaries, so they view MDNR as a training ground. (Childers)

Response 4b: Global perspective can accelerate the need for change. For example, in China, they have 200-250 environmental protests a year. China is not on the verge of an environmental disaster, it is in the middle of several. People there are saying that they no longer want economic over environmental growth. (Cooper)

Response 4c: The rate can be determined by education. For example, recycling took very quickly. Education played a role in that. (Kricun)

Response 4d: Enrollment in civil engineering has increased in the past few years after a dip, and may be as high as ever. We need to promote the value of working in the water industry. (Dahab)

In closing,

- Change is hard. Adapting to the crisis in infrastructure is going to take a lot of change.
- We assume risk in making those changes. Challenge for all to go back and think about where everyone can make those risks to move forward.

### **Final Forum Session – Summary of Track Topic Discussions**

At the final Forum Session, each of the lead facilitators reported out on the outcomes of their session. Concluding remarks were also made by Mr. Robert Tolpa, Acting Director Region 5 Water Division, and by Tracy Mehan, the master of Ceremonies and previous Assistant Administrator of the Office of Water at EPA. Their speeches as well as those of the Track Leaders can be viewed in the video available from the Forum. This section of the Detail Report will just present the bare bones of the track summary presentation. The full presentation is included as an attachment to this report.

#### **Track 1: Innovative Technical Solutions**

- Moving a New Technology through R&D Phases to Implementation
- How Engineers Firms Can Help Communicate Research Needs and Help Move New / Innovative Technologies to Implementation
- How Academic Institutions can Provide Solutions to Help Meet Infrastructure Needs
- How State Plan Approval Programs Deal With New / Innovative Technologies
- How Municipal Infrastructure Managers Decide If/When to Implement New/Innovative Approaches
- EPA's Role in Fostering and Conducting Research in Support of the Sustainable Infrastructure Initiative
- Green Infrastructure/LID Approaches for Meeting Infrastructure Needs

#### **Significant Challenges**

- Processes for regulatory approvals and standards updates
- Funding of Research Work
  - Small Companies / Big Costs
  - Ramping up from lab tests to “real world” testing
- Documenting the performance of new technologies
  - Decision-makers will avoid technologies about which there is uncertainty (people are risk-averse)
- Liabilities (if new technology fails)
  - Utility
  - Engineering Firm
  - Approval Agency
  - Regulatory Enforcement Staff Also Risk-Averse
- Contractor Lack of Familiarity
- Uncertainty/Complexities re: Maintenance

- What is needed, what does it cost?
  - Who will do it?
- Mechanisms to facilitate flow of info about new technologies to academic institutions
  - Teaching
  - Research
- Collaboration between disciplines
- Institutional incongruities
- Resources for state approval programs
- Dissemination of research results; putting research findings into practice

### **Approaches for Improvement**

- Approval Agency Ombudsman or Liaison
- Direct Communication with Review Boards
- Agency Access To Technical Resources
  - For radically different/new technologies
- Updated Criteria/Protocols
  - For radically different/new technologies
- Education/Communication on new technologies
  - Forum, Clearinghouse, webcasts
  - Share the news, opportunities for collaboration
- National or regional testing of new technologies (e.g., storm water)
  - Economies of Scale
  - Standardization of Criteria/Approvals
  - Assistance to Communities Considering New Technologies
- Pilot / phase in new technology
  - Back-up or contingency
- Adaptive Management
- Teaching
  - Integrate sustainability into undergraduate and graduate curricula
  - Integrate construction and O & M into designs
  - Include “soft” approaches (e.g., demand reduction → water conservation)
  - Continuing education

### **Follow-up Steps/Action Items**

- Outreach to stakeholders (Utilities, Engineers & Contractors) in Practical Sustainable Infrastructure Implementation, New Technologies
- Sponsor local Pilots/Case Studies
- Recognition (Awards) for Successful Sustainable Infrastructure Projects
  - Internal recognition as well
- Standards for stormwater controls → EPA?
  - Economies of scale
  - Standardization
  - Links to permits / regulatory programs
- Expand / take advantage of programs:
  - STAR
  - SBIR

- Cooperative research
  - Development agreements
- Communication / education
- Pilots
- Bring diverse groups together to work on problems
- Quantification
  - Performance
  - Costs and benefits
- Optimize processes for reviewing new technologies, establishing standards

### **Track 3: Reducing Utilities Future Costs**

#### **Problems, Needs and Challenges**

- Need better means to utilize regional management solutions as a way to reduce capital and operational costs.
- Better communication with City Council and public is needed to raise awareness of the value of water.
- Need to manage using watershed approach.
- Need to consider variability in commodity costs in planning future capital costs.
- Focus on appropriate technology for community size.
- Compliance timeframes should be flexible/extendable and should allow for longer timeframes.
- Based on declining populations in small communities, an analysis is needed to determine where decommissioning is most efficient. Technical assistance is needed to accomplish this analysis. (*Track Leader note: This is also true for larger communities.*)
- There's a challenge of competing goals (water quality standards, public health) for the utilities.

#### **Pathways to Progress**

- Challenge: Need ways to utilize management solutions to reduce capital/operational costs
  - Maximize economies of scale
  - Regionalize community education
- Challenge: Raise City Council and public awareness of value of water
  - Federal, state, local agencies run ad campaigns to sell the same message
  - Use a business approach to educate (Asset Management)
- Challenge: Need to manage using watershed approach
  - Generate and share water quality monitoring data (Chesapeake, Milwaukee)
  - Legislate unregulated agricultural community
- Challenge: Need to consider variability in commodity costs in planning future capital costs
  - Innovation/new technology to replace what's not available
  - Better planning/prioritize spending

### **Turning ideas into action**

- Challenge: Need ways to utilize regional management solutions to reduce capital/operational costs
  - Resurrect & review 208 area-wide management plans
  - Encourage SRF to use Drinking Water's approach to emphasize regionalization
- Challenge: Raise City Council and public awareness of value of water
  - Provide council members with scripts to educate public
  - Develop documentary of a small town going through education process
- Challenge: Need to manage using watershed approach
  - Hire lobbyists to develop legislation for unregulated agricultural communities
  - Inform / educate unregulated agricultural communities regarding impending legislation
- Challenge: Need to consider variability in commodity costs in planning future capital costs
  - Encourage pilot studies for non-material intensive infrastructure solutions
  - Reward innovation fairly with respect to benefit provided

#### **Track 4: Solutions for the Small Utility**

- Paying for Sustainable Infrastructure – Obstacles and Options
- Capacity Development Program – A Framework for Sustainability
- Utility Partnerships – Gaining Operational and Managerial Efficiencies
- Roles of Key Audience Groups in Implementing Sustainability Solutions

#### **Significant Challenges**

- Industry structure/ownership characteristics
- Lack of technical knowledge about State and federal requirements (and how to meet them)
  - Operator salary / training
- Recognition of and willingness to gain access to capital
  - Need to fit financing instruments to different cases
- Lack of economies of scale, leading to a high per-customer cost of operations
- Lack of financial / managerial capacity
  - Financial incentives / requirements
  - Board member training
- Lack of affordable technologies to comply with existing and new technologies
- Public awareness of small system needs

#### **Approaches for Improvement**

- Truly understand small community differences
  - Targeted use of SRFs
  - Overcoming the barriers to consolidation
  - System Management Intervention Program
  - Implementation of “real” asset management
  - Promotion and acceptance of alternative compliance technologies
  - Raising public awareness

#### **Follow-up Steps/Action Items**

- Further promotion of the Operator Certification expense reimbursement grant program (DW only)
- “Personalized” information for customers
- Continuity mechanisms / diagnoses
  - Procedural
  - Operational
  - Cost of replacing key staff / identifying costs of services provided by volunteers
- Investigate feasibility of Intervention Program